

# Research Notes

## *Participatory Health Governance and HIV/AIDS in Brazil*

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### ABSTRACT

This research note assesses participatory health governance practices for HIV and AIDS in Brazil. By extension, we also evaluate municipal democratic governance to public health outcomes. We draw from a unique dataset on municipal HIV/AIDS prevalence and participatory health governance from 2006–17 for all 5,570 Brazilian municipalities. We use negative binomial regression and coarsened exact matching with treatment effects to estimate the influence of community health governance institutions on HIV/AIDS prevalence. Municipalities with participatory health councils experience 14% lower HIV/AIDS prevalence than other municipalities, all else equal. Family Health Program coverage, municipal state capacity, and municipal per capita health spending are also associated with systematically lower HIV/AIDS prevalence. We conclude that participatory health governance may combat HIV and AIDS through municipal spending, education, and community mobilization. Municipal health councils can facilitate these strategies and offer opportunities for improving well-being around the world.

*Keywords:* governance, public health, HIV, AIDS, Brazil, Latin America, participation

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## INTRODUCTION

The involvement of citizens in health policymaking has the potential to reshape the delivery of public services. Advocates of participatory processes hope that direct, ongoing engagement will lead to more effective use of public resources and also help public health officials to connect with hard-to-reach populations (Farmer et al. 2013; Mansuri and Rao 2013; Fox 2015; Wampler 2015). Since the 1978 Alma Ata Declaration, many public health officials have shifted toward preventive care and greater involvement of community members in the design and delivery of services (World Health Organization 1978). Much of this focus has involved reorientation of medical care toward integrative community-based health (Farmer et al. 2013).

In this article we highlight an often-neglected side of community engagement in health by assessing how the presence of participatory health governance systems affects health outcomes. More specifically, we demonstrate that the presence of municipal-level health-oriented participatory councils are associated with lower levels of HIV/AIDS in Brazil from 2006–17.<sup>1</sup> This research builds on extensive qualitative scholarship connecting Brazil's municipal policy management councils to better health governance and a variety of health outcomes at the state and national levels (Pires 2011; Lavalle et al. 2016; Leal and Lui 2018; Rich 2019; Martelli and Coelho 2021). We then provide some of the first quantitative tests of many of the hypotheses developed in earlier research on a large-N sample of all Brazilian municipalities over time and across space. Our analysis is inspired by the work of Dr. Paul Farmer, founder of Partners in Health, and uses a *biosocial* framework to highlight the ways in which broad social and political forces can influence health in the context of diseases such as AIDS. As his coauthors explain:

Most medical research focuses exclusively on the biological causes of disease. A biosocial approach posits that such biologic and clinical processes are inflected by society, political economy, history, and culture and are thus best understood as interactions of biological and social processes. Biosocial analysis of global health challenges reaches across disciplines and breaks down the boundaries that separate them; for example, understanding questions of resource optimization, which are usually reserved for economists, also requires insights from anthropologists and health practitioners. One central illustration of the biosocial nature of disease is the correlations between disease risk and poverty. (Farmer et al. 2013, 17)

By embracing the biosocial approach, we therefore investigate the broad ways in which municipal politics may influence to HIV/AIDS outcomes. Our contribution lies in our focus on the often-neglected role of local politics and the ways it is associated with HIV and AIDS prevalence.

Our second contribution is to evaluate a broad range of covariates that might also influence public health outcomes, including dimensions of the municipal political and socioeconomic context. Researchers have increasingly leveraged Brazil's federal structure to examine municipal variance in several public health outcomes, including infant mortality and hospitalizations (Macinko et al. 2006; Rasella et al. 2013; Macinko and Harris 2015). Yet, most scholars have not integrated an analysis of municipal community participation in health alongside program assessments.

Our analysis demonstrates that the presence of participatory policy management councils related to health, nationally designed but municipally delivered community health programs, municipal administrative capacity, and municipal health spending all play an important role in reducing the prevalence of HIV/AIDS. The result is a new understanding of how different aspects of municipal community health governance work together to improve public health and deter the spread of HIV and prevent AIDS.<sup>2</sup>

Numerous participatory health governance practices have emerged to combat HIV/AIDS in Brazil, and many of them are associated with improved outcomes at the state and national levels (Rich 2019). However, none have been evaluated quantitatively across all of Brazil's municipalities. Similarly, some previous quantitative studies have connected the quality of municipal democratic governance to public health outcomes (Gonçalves 2014; Touchton et al. 2017; Wampler et al. 2019), but not these specific programs for HIV/AIDS. We searched PubMed and LILACS using the search terms "HIV and AIDS." We searched these sources up until January 31, 2023, including publications in English, Portuguese, and Spanish. We did not identify any ecological study of participatory institutions or the Family Health Program and HIV/AIDS in Brazil.

To our knowledge, ours is the first ecological study to simultaneously analyze the effects of new democratic institutions and social policies on the prevalence of HIV/AIDS. We draw from a unique dataset on HIV/AIDS prevalence and participatory health governance from 2006–17 for all 5,570 Brazilian municipalities, which, once published, will also assist researchers and policymakers around the world. We find that participatory health governance is associated with low prevalence of HIV/AIDS. HIV/AIDS is closely related to poverty and sensitive to targeted interventions in the form of municipal spending, education, and community mobilization. Municipal policy management councils facilitate these strategies and thus offer opportunities for improving well-being in Brazil and around the world.

### **Participatory Institutions for Participatory Health Governance**

Brazil developed a municipal, participatory governance architecture of policy management councils, policy conferences, and participatory budgeting in the 1970s and 1980s and expanded it in the 1990s and 2000s (Pires 2011; Wampler 2015). "Democratization produced new state actors who were motivated to support civic organization and mobilization. Democratization also created institutional channels for these new state actors to engage civil society as allies" (Rich 2019, 88). These included HIV/AIDS commissions at national, state, and municipal levels as well as policy management councils in areas related to health at all three levels. The direct incorporation of citizens through health-related policy management councils generates three new forms of policy engagement: (1) citizens deliberate over and design specific social services and projects; (2) information is exchanged among public officials and community leaders; and (3) citizens monitor policy implementation.

HIV/AIDS commissions are more consultative than deliberative venues and often lack budgetary authority. However, the commissions have historically been the greater sites for incorporating civic organizations into HIV/AIDS policymaking, particularly in more populous municipalities (Le Loup et al. 2009; Rich 2019). Brazil's vibrant environment braided knowledge and practices related to activism, science, public health, governance, and philanthropy in which each constituency maintained its independence, to ultimately advance progress on HIV/AIDS (Cueto and Lopes 2022b).

The most frequently adopted municipal participatory institutions are *conselhos*, or policy management councils. There are roughly 60,000 of these councils at the municipal level and more than 300,000 residents are elected to their ranks (Wampler 2015). Brazil's federal government induces the municipal adoption of health, social assistance, and several other councils through regulations and financial incentives, but there are at least 21 other types of councils (women's rights, environmental sanitation, food security, and rural development) that municipalities adopt without federal incentives. We argue that the adoption of "voluntary" councils related to health reflects a broader commitment to health governance than the near-universal adoption of health councils, which may exist formally, but not function in practice (Wampler et al. 2019). Voluntary policy councils related to health are prominent participatory venues, but, importantly, do not exist everywhere and thus provide analytic leverage for evaluating their impact by exploiting municipal variation.

Brazil's municipal HIV/AIDS commissions oversee much of the municipal policy design and delivery of services surrounding HIV/AIDS and also have participatory components (da Fonseca and Bastos 2018; Rich 2019). These commissions are connected to state and national commissions, as well as municipal policy councils (Rich 2019). "Bureaucrats in the national AIDS program were motivated to expand independent civic organization and mobilization in the early 2000s, when AIDS policy was decentralized, because the increased AIDS policy authority of mayors and governors threatened to undermine the national policy model they had built" (Rich 2019, 112). HIV/AIDS commissions are essential for reducing the transmission of HIV/AIDS, and form part of the participatory architecture that governs municipal health policy and service delivery in Brazil (da Fonseca and Bastos 2018). However, we cannot evaluate HIV/AIDS commissions directly across all of Brazil's municipalities due to a lack of data. Moreover, many of the earlier arguments surrounding the governance of HIV/AIDS policy occurred at the state level. Instead, we evaluate similar arguments for public participation, health governance, and health outcomes at the municipal level.

Municipal policy councils themselves are not usually the primary venues for specific activities surrounding HIV/AIDS, but they have budgetary authority for health and are a principal component of broader health governance. Further, they serve as an early platform for civil society to pursue municipal HIV/AIDS policy. As Parker (2009, 50) argues, "Citizen representation on health councils at every level of government . . . would come to have significant implications for the elaboration and implementation of HIV and AIDS related policies and programs over the next two

decades.” Council members also engage in regular rights-claiming activities and serve as important linkages between the community, grassroots organizations, and municipal-level service providers. Additionally, policy management councils are a common venue for engaging civil society activists at the state level, even when policy commissions more frequently connect HIV/AIDS activists with governments (Rich 2019). In this context, constitutional “rights-based” social protections to health and anti-discrimination provisions can buttress claims for access to HIV/AIDS prevention and treatment.

Many of Brazil’s municipal policy councils promote health in general, as well as HIV prevention and HIV/AIDS treatment as one of many municipal health activities. The membership of these councils often has considerable overlap with other, related councils and with civil society partners. Rich (2019) demonstrates that state health councils serve as important spaces for civil society to demand HIV/AIDS treatment, and function as important institutional interlocutors with progressive federal bureaucrats who leverage them for oversight. Moving from the state to the municipal level, when multiple interrelated municipal councils operate, they go further by creating a constellation of interlocking institutions that buttress health outcomes (Touchton et al. 2017; Mayka 2019). For example, members of the health council, environmental sanitation council, and children’s rights councils work together in Rio de Janeiro on informal needle exchange programs to remove discarded needles from public spaces.

We argue that Brazil’s municipal policy councils retain a plausible connection to HIV/AIDS outcomes and are worth evaluating as one of several elements of Brazil’s capacity to deliver services surrounding education, prevention, testing, and treatment (da Fonseca and Bastos 2018). Councils’ oversight and demands for public health spending along with rights-claiming for healthcare and universal access thus provide a supportive infrastructure that can theoretically broaden access to HIV testing and HIV/AIDS treatment. Moreover, data is also available on councils’ presence across all of Brazil’s municipalities, whereas we cannot access full comparative data on the presence or robustness of HIV/AIDS commissions. Our study, then, is the first that allows for a cross-municipal, quantitative assessment of these participatory institutions’ relevance to municipal efforts to combat HIV and AIDS over time and across space.

HIV/AIDS represents a hard test of participatory health governance hypotheses relative to other health outcomes, such as infant mortality, that fall under the category of “protecting innocent lives” and, as a result, are less controversial than efforts to combat HIV/AIDS. Despite legal protections, carriers of HIV/AIDS still face social stigma; it is possible that institutions shown to work well in some areas might meet with religious objections, bigotry, contested budgets, political opposition, or other barriers that could limit participatory institutions’ efficacy (Valle 2015; Malta 2018; da Fonseca et al. 2021).

We do not assess the proximate causes of HIV, AIDS, or other infectious diseases in the ways that medical clinicians would. Rather, our theoretical and empirical interests focus on how municipal-level governance systems and institutions may affect

HIV/AIDS rates. HIV, AIDS, dengue, or any other infectious disease represents a “difficult” case that we use to evaluate municipal governance relative to an “easy” case like infant mortality. Infant mortality responds quickly to relatively inexpensive interventions across many different mechanisms, such as clean water, better education, prenatal and neonatal checkups, better hospital infrastructure, more doctors and nurses, etc. Both HIV and AIDS are more difficult to prevent and treat but may respond to social interventions that emerge from different government arrangements that deliver better education, health facilities, health services, and shift broader municipal budgets toward prevention and treatment. The various municipal policy management councils do not explicitly target infant mortality, dengue, HIV, or AIDS in their names or official missions, yet they can all potentially bring co-governance arrangements to bear on mosquito abatement, water quality, prenatal nutrition and healthcare, neonatal nutrition and healthcare, and many other programs that could reduce dengue and infant mortality. Activities across these policy management councils could also impact HIV and AIDS, as well as both incidence and prevalence, despite the differences in diseases and measures.

Examining the impact of these institutions and policies in the aggregate sheds light on the extent to which these dynamics are occurring across Brazil’s municipalities and the potential limits of participatory health governance’s reach. Assessing the relationship between municipal participatory spaces and HIV/AIDS outcomes is particularly important given trends in Brazil and HIV/AIDS policy since 2019, including the reduced status of HIV/AIDS as a special policy priority, decentralization of HIV/AIDS prevention, and the rise of radical conservative authoritarian and religious forces (Cueto and Lopes 2022a).

## METHODS

We draw on an original dataset covering Brazil’s 5,570 municipalities from 2006 to 2017 to evaluate connections between municipal health governance and HIV/AIDS prevalence. Our database includes indicators for participatory health governance in the form of municipal policy management councils plausibly related to health, coverage of eligible populations within the Family Health Program, a state capacity indicator based on the quality of municipal service delivery, and, finally, several control variables that could also impact public health provision (region, municipal wealth per capita, and health budget per capita). This translates into one of the largest datasets on subnational policies and public health in the developing world.

Only a few studies on participation address broader, population-wide outcomes that might be associated with participatory institutions, often because quantitative data on the presence of these institutions and outcomes hypothesized to connect to these institutions are not available. We used freedom of information requests to access and then merge unusually rich public data from several different Brazilian government sources to test hypotheses for the first time from a quantitative perspective. This research thus builds on extensive previous qualitative work on health governance and health outcomes in Brazil and provides a new test of state-level arguments at the

municipal level (Pires 2011; Lavallo et al. 2016; Leal and Lui 2018; Rich 2019; Martelli and Coelho 2021).

## DATA SOURCES

We compiled the data used in this study from a variety of public sources using data on government websites and freedom of information requests. Brazil's Ministry of Health provided information on municipal HIV and AIDS cases and the percentage of eligible recipients receiving benefits through the Family Health Program (Programa Saúde da Família, or PSF). Data on health councils, women's councils, and others related to health come from the annual municipal survey (MUNIC) of the Brazilian Institute of Geography and Statistics (IBGE). The survey reports on the presence of up to 21 municipal policy councils over time. These include federally induced and legislatively mandated councils, such as health and education, where there is near-universal adoption at the municipal level. The survey also records the presence of many other councils that are not required or federally induced, resulting in considerable municipal variation. Coverage of the Bolsa Família program comes from the Ministry of Social Development (MDS), while data on socioeconomic covariates comes from the Brazilian Institute of Geography and Statistics.

## DEPENDENT VARIABLE

### Municipal HIV and AIDS Prevalence

The number of adults aged 18–49 with HIV/AIDS per 1,000 municipal residents, reported annually from 2006–17, is our indicator for municipal HIV and AIDS prevalence. We used freedom of information requests within Brazil to gain access to annual municipal data on HIV/AIDS prevalence, which, to our knowledge, is not available on government websites, but is routinely collected. However, these data do not distinguish between HIV and AIDS and report their combined prevalence. The mean is 0.59 and the standard deviation is 0.08 (overall prevalence in 2017: 0.42 [0.31 – 0.53]). The data comes from the Huber and Stephens (2012).

## INDEPENDENT VARIABLES

### Participatory Health Governance

The voluntary adoption of policy management councils in areas related to health are our indicators for participatory health governance. The variables reflect the municipal presence or absence of voluntary councils plausibly associated with HIV/AIDS prevention and sexual health (health and sanitation council, women's rights councils, LGBTQ councils, environmental sanitation councils, and human rights councils). We code this variable as the raw count of the councils. The mean is 1.8 of five councils;

14% of municipal-year observations feature municipalities that had all five of these voluntary councils related to health (IBGE 2018).

Many councils, including health councils, are adopted because they are mandated by federal law or induced through regulations for fiscal transfers to municipalities. As a result, health councils are nearly universal across Brazil's municipalities and there is little variation in their presence. We argue instead that focusing on voluntarily adopted councils, which municipalities adopt without federal inducements, is important for several reasons. First, some of the councils that carry federal funding, such as the basic health councils, are omnipresent, hence, there is a lack of variation that would allow us to assess any differential impact across municipalities without additional data on those councils' performance.

Second, institutions that are voluntarily adopted may reflect a greater commitment to health governance than institutions that are required for the municipality to receive federal funding; these "mandated" councils may only reflect the municipal government's interest in securing funding, which results in councils that rarely meet or only exist "on paper." Finally, we only have full municipal data on the presence of the councils from the IBGE's MUNIC surveys, not their efficacy, composition, or activities. There may be other voluntary councils related to healthcare in many of Brazil's municipalities, but they are not reflected in the available longitudinal data from the MUNIC surveys. Thus, our proxy for commitment to participatory health governance for HIV/AIDS is the voluntary councils that could relate to policy design, implementation, oversight, evaluation, and reform for HIV/AIDS.

### PSF Coverage

We capture information on a key social program that targets low-income Brazilians and promotes preventive health: the PSF. We expect this program to help limit the spread of HIV/AIDS because it expands access to basic healthcare, including providing sexual education, and spurs poor families to seek basic health services through domicile health visits, vaccinations, and community education. Pregnant women and newborns are among the populations served; thus, the program is likely to influence HIV contraction and transmission. The Ministry of Health collects annual data on the percentage of the eligible population that receives benefits from the PSF. The mean coverage level is 81% and the standard deviation is 29.

## CONTROL VARIABLES

### Municipal Administrative Capacity

Municipal administrative capacity is also likely to influence health service delivery and subsequent health outcomes through the quality of service delivery. We capture variation in municipal administrative capacity through a measure of the quality of municipal management of the Bolsa Família program. Bolsa Família is a large



conditional cash transfer program, with conditionalities focused on education and health, including prevention of disease transmission through prenatal care and sexual education by incentivizing school attendance through students' teenage years (Lindert et al. 2007; Olson et al. 2019). The program is administered at the municipal level and management quality varies considerably. The MDS offers greater funding to cities that perform better on an annual Index of Decentralized Management (IGD). The quality of municipal management should therefore reflect a combination of municipal political commitment as well as existing municipal capacity. Municipal capacity to manage poverty reduction problems, such as Bolsa Família, potentially extends to capacity in other areas, like broad health and education services, which plausibly connect to health outcomes, including for HIV/AIDS.

High management performance should also reflect municipal capacity to build and maintain health clinics and hospitals, deliver PSF benefits, and ultimately influence HIV/AIDS prevalence. We control for these capacities by including the MDS's annual IGD ratings for each municipality in our models. This variable is continuous from 0 to 1 (low to high); the mean score is 0.76 and the standard deviation is 0.15.

### **Municipal Healthcare Spending**

We control for per capita municipal healthcare spending in our models. We assess whether municipal healthcare spending influences municipal service provision and health outcomes. Brazil has relatively high public goods spending per capita, but low quality health outcomes for the expenditure (McGuire 2010; Sugiyama 2012). There is also a noted disparity in spending between wealthier cities and poorer cities in Brazil, which we expect will help to explain variance in healthcare provision and outcomes. This measure also accounts for variation in municipal revenue and a general increase in municipal spending throughout the time frame of our study. The measures are in constant Brazilian reais (2010) and come from Brazil's Health Ministry. We use the base-10 logarithm of the raw values in our models. We also include a robustness check using per capita municipal GDP instead of health spending to account for additional, unobserved economic and resource-related characteristics of the municipal context.

### **Mayor's Party**

Mayors from Brazil's Workers' Party (PT) and other parties on the political left historically adopted and supported participatory institutions at greater rates than non-PT and non-left mayors, which could influence institutional performance (Huber and Stephens 2012). We begin with a dummy variable coded as "1" if municipalities have a mayor from a party classified as on the political left in a given year, with mayors from other parties receiving a score of "0." We follow this with a model presented in table A1 of the appendix comparing PT mayors to those all other parties. These data come from Brazil's Superior Electoral Tribunal (2022).

## Population Density

We control for population density in models of HIV/AIDS in Brazil. HIV/AIDS rates are higher in Brazil's densely populated cities, and cities have different organization and service-delivery capacity relative to rural municipalities. These data come from the Brazilian Institute for Geography and Statistics (IBGE 2022).

## ESTIMATION STRATEGY

We deploy several different strategies to estimate HIV/AIDS prevalence in Brazil. First, we follow Rasella et al. (2013) and Macinko et al. (2006) and use conditional negative binomial models with municipal fixed effects to estimate relationships between community health governance and HIV/AIDS. Negative binomial regression models are appropriate when count and rate outcome data are overdispersed, as they are for HIV/AIDS, where the unconditional mean is less than the variance (Hilbe 2007).

We also address concerns for endogeneity in several different ways. First, we use coarsened exact matching (CEM) as an identification strategy for causal inference. This strategy allows us to simulate a randomized controlled trial, with treatment and control groups, while still relying on observational data (Iacus et al. 2019). We preprocess the data to assess whether municipalities that adopt community health governance programs (the treatment) exhibit systematically different HIV/AIDS prevalence rates than municipalities that lack these health governance programs (the control), but are as similar as possible in terms of per capita health spending, coverage in other programs, municipal state capacity, and the mayor's party.

The results of estimation using negative binomial regression with municipal and year fixed effects appear in table 1.

Our most important finding surrounds the role of municipal policy management councils for HIV/AIDS. Voluntary policy councils related to healthcare have a strong, negative, statistically significant connection to HIV/AIDS prevalence in Brazil. *We estimate that the presence of these councils is associated with 14% fewer HIV/AIDS cases per 1,000 residents in Brazil's municipalities.* On average, we estimate that voluntary councils related to healthcare are associated with approximately 600 HIV/AIDS cases per year across Brazil and more than 7,000 for the years in our study. Over a decade (2006–17), the estimate for total HIV/AIDS cases if all municipalities *had shown* a commitment to voluntary councils related to healthcare is 220,000 fewer than if municipalities had not.

These results align with the idea that targeted councils would improve healthcare outcomes for related populations. These independent variables have strong statistically significant connections to the dependent variables using negative binomial regression. Our first set of results extends evidence demonstrating the benefits of community participation for health (Farmer et al. 2013). It also lends support to the insight that Brazil's relative progress with HIV/AIDS treatment, when compared with South Africa, may result from greater connectivity and solidarity across groups

Table 1. Fixed Effects Negative Binomial Models for Association between HIV/AIDS Prevalence per 1,000 Residents, Number of Policy Councils, and PSF Coverage, 2006–17

Variables	Policy Council Model	Family Health Plan Models
Low Number of Councils (0–1)	1.40 (1.26)	
Intermediate Number of Councils (2–3)	–0.74* (0.28)	
High Number of Councils (4–5)	–1.59** (0.16)	
Low PSF Coverage (0–60%)		1.22 (0.81)
Intermediate PSF Coverage (61–80%)		–1.34** (0.25)
High PSF Coverage (>80%)		–2.51** (0.14)
Bolsa Família Management (>0.76)	–1.77** (0.39)	–1.57** (0.22)
Per Capita Health Spending (>5.77)	–2.69** (0.31)	–2.30** (0.52)
Left-Wing Mayors	–0.64* (0.27)	–0.71* (0.32)
Population Density (>25 per km <sup>2</sup> )	0.48* (0.20)	0.36* (0.15)
Number of Observations	53, 290	53,318
Number of Municipalities	5,092	5,107

*Note:* Data are rate ratio (95% CI).

\*Indicates significance at better than 0.05 (two-tailed test).

\*\*Indicates significance at better than 0.01 (two-tailed test).

(Gauri and Lieberman 2006). Participatory councils help diverse communities to engage one another to advance a common agenda, which is crucial for addressing potentially stigmatizing diseases such as HIV/AIDS.

Coverage in the PSF is also related to HIV/AIDS prevalence. Municipal HIV/AIDS rates are systematically lower as PSF coverage increases. Further, PSF health teams began focusing explicitly on care management for HIV in 2013. A temporal dummy variable interacted with PSF coverage captures this shift and demonstrates even stronger results for the post-2013 data. This finding reinforces the idea that prevention and care management can be combined effectively through community-based health services.

Among the control variables, our indicators for municipal state capacity and per capita municipal healthcare spending are related to HIV/AIDS prevalence. HIV/AIDS prevalence is systematically lower in the context of higher quality municipal management of the Bolsa Família program. HIV/AIDS prevalence is also lower as municipal health spending increases. Both variables may thus reflect the quantity and quality of municipal health services, including those surrounding HIV/AIDS. Mayors on the political left are associated with lower prevalence of HIV/AIDS, whereas population density is associated with higher prevalence.

Table 2. Fixed Effect Negative Binomial Models for Association between HIV/AIDS Prevalence per 1,000 Residents, Number of Policy Councils, and PSF Coverage, 2006–17

Variables	Policy Council Model	Family Health Plan Models
Low Number of Councils (0–1)	0.27 (0.19)	
Intermediate Number of Councils (2–3)	−0.38** (0.10)	
High Number of Councils (4–5)	−0.86** (0.24)	
Low PSF Coverage (0–60%)		0.35 (0.31)
Intermediate PSF Coverage (61–80%)		−0.44* (0.20)
High PSF Coverage (>80%)		−0.72** (0.18)
Bolsa Família Management (>0.76)	−0.11 (0.10)	−0.09 (0.09)
Per Capita Health Spending (>5.77)	−0.16* (0.08)	−0.05 (0.08)
Left-Wing Mayors	0.03 (0.03)	−0.04 (0.05)
Population Density (>25 per km <sup>2</sup> )	0.06 (0.04)	0.06* (0.03)
Number of Observations	53,162	53,219
Number of Municipalities	5,049	5,086

*Note:* Data are rate ratio (95% CI). These models estimate average treatment effects using CEM.

\*Indicates significance at better than 0.05 (two-tailed test).

\*\*Indicates significance at better than 0.01 (two-tailed test).

Next, we use matching to address the endogeneity problem associated with estimating relationships between community health governance programs and health outcomes. We match municipalities with other, very similar municipalities in terms of Bolsa Família management (our proxy for municipal administrative capacity), per capita municipal health spending, the mayor's party, and population density. The main difference between these matched pairs is that one features municipal policy councils related to health in a given year (the treatment) and the other does not (the control). We repeat this exercise for Family Health Plan coverage, where the simulated treatment is different levels of PSF coverage as a percentage of the eligible population. We then use parametric estimation on the preprocessed data to test our central hypotheses. We present the results of matching using a CEM algorithm based on balance tables of covariates to assess optimal matching schemes.

Estimates in table 2 equate to HIV/AIDS rates that are approximately 11% lower in municipalities with a commitment to policy councils related to health. Moreover, the presence of women's councils is also associated with systematically lower rates of HIV/AIDS—the only individual policy council that has a relationship with HIV/AIDS prevalence. The results in table 2 corroborate those in table 1 above.

Municipalities exhibit lower levels of HIV/AIDS when they adopt policy management councils related to health.

We follow these results by estimating several additional models to check the robustness of our findings. First, we substitute PT mayors for those on the political left. Next, we estimate models using a measure of municipal civil society density as a control variable, though data is only available from 2004–6. Finally, we add year dummy variables to our primary models to assess the possibility that improvements in testing after 2013 resulted in higher HIV/AIDS prevalence, especially in municipalities with high administrative capacity. Our results are robust to the inclusion of these variables and provide support for civil society organizations' impact on reducing HIV/AIDS prevalence as well. There is greater HIV/AIDS prevalence after 2013 across all municipalities, which could reflect better testing and reporting. Finally, there is no statistically significant relationship between PT mayors and HIV/AIDS prevalence.

## IMPLICATIONS FOR PUBLIC HEALTH

There are three potential reasons why the municipal emphasis on participatory health governance is associated with HIV/AIDS prevalence: (1) council members design health policy in a way that matches community needs; (2) citizens and community leaders signal their health policy preferences to government officials, who use that information as they deliver health services beyond the policy councils; and (3) policy councils develop ongoing ties among government officials and community leaders, which decrease the informational asymmetries that so commonly plague state–society relations and impede sensible health service delivery.

Participatory governance is essential for reducing the transmission of HIV and the prevention of AIDS. Due to a lack of data, we cannot evaluate the direct role of HIV/AIDS commissions in this article. However, complementary policy management councils are connected to health governance in many ways, including efforts to combat HIV/AIDS at the state level (Le Loup et al. 2009; Parker 2009; Rich 2019). Our evidence demonstrates that the efforts of municipal elected officials, social movements, and international organizations to combat HIV/AIDS by promoting direct citizen participation in policymaking are associated with positive outcomes.

Further, municipal community health initiatives also have strong associations with HIV/AIDS prevalence. We find that universal access to preventive community-based healthcare is associated with reducing the prevalence of HIV/AIDS. Taken together, these results allow us to better understand how features of municipal participatory health governance and expanded service delivery can work together to mitigate the spread of HIV/AIDS. However, we also recognize the need for qualitative research to trace processes and better identify causal mechanisms connecting municipal health governance to HIV/AIDS prevalence as others have done at the state and national levels (Rich 2019). Brazil's policy councils are powerful tools for health governance, but the focus of those we study are indirectly related to HIV/AIDS. Instead, the policy councils and the PSF likely buttress the HIV/AIDS commissions,

rights-based advocacy for healthcare, as well as access to health services in general. Additionally, separating incidence from prevalence and HIV from AIDS will be necessary to understand these relationships and motivate more research that tests these arguments in the aggregate.

The governance processes and social policies we highlight in this article are not unique to Brazil. Increasingly, municipal participatory councils, community-based preventive health, and cash transfer programs with health conditionalities are taking root in middle-income and developing countries (Sintomer et al. 2012; Vlahov 2015). There is potential for similar gains elsewhere if programs are adopted in a similar manner.

## NOTES

1. HIV and AIDS are different diseases, incidence is different from prevalence, and these differences are often important from a policy standpoint. The unique public data we received from Brazil's Health Ministry through freedom of information requests, however, report combined annual information on the number of municipal cases of both HIV and AIDS. These data do not distinguish between the two diseases and do not report new cases versus existing cases to assess incidence. Correspondence with the Ministry confirms these data are the only ones available at the municipal level. Thus, separating HIV from AIDS and incidence from prevalence will not be possible in this note. We therefore refer to the diseases together as HIV/AIDS and to prevalence in the remainder of the research note.

2. HIV (human immunodeficiency virus), if left untreated, can lead to AIDS (acquired immunodeficiency syndrome). Preventive public measures can deter the spread of HIV and antiretroviral therapy can reduce viral loads and prevent AIDS, the latter stage of HIV infection. As the Brazilian Ministry of Health reports both HIV and AIDS together, we do so as well here (see footnote 1 above for a deeper discussion of the limitations of our data).

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## Appendix for Participatory Health Governance, HIV, and AIDS in Brazil

Table I. (a) Fixed effects negative binomial models for association between HIV/AIDS prevalence per 1,000 Residents, Number of Policy Councils, and Family Health Program Coverage, 2006-2017. Data are rate ratio (95% CI). This model uses PT mayors as a control variable instead of mayors on the political Left.

Variables	Policy Council Model	Family Health Plan Models
Low Number of Councils (0-1)	1.41 (1.26)	
Intermediate Number of Councils (2-3)	-0.77* (0.26)	
High Number of Councils (4-5)	-1.61** (0.16)	
Low FHP Coverage (0-60%)		1.22 (0.76)
Intermediate FHP Coverage (61-80%)		-1.31** (0.28)
High FHP Coverage (>80%)		-2.46** (0.15)
Bolsa Família Management (>0.76)	-1.74** (0.36)	-1.59 (0.20)
Per Capita Health Spending (>5.77)	-2.69** (0.31)	-2.31** (0.49)
PT Mayors	-0.23 (0.20)	-0.17 (0.14)
Population Density (>25 per KM <sup>2</sup> )	0.46* (0.21)	0.36* (0.15)
Number of Observations	53, 299	53,337
Number of Municipalities	5,093	5,110

\*indicates significance at better than 0.05 (two-tailed test).

\*\*indicates significance at better than 0.01 (two-tailed test).

Table II. (a) Fixed effects negative binomial models for association between HIV/AIDS prevalence per 1,000 Residents, Number of Policy Councils, and Family Health Program Coverage, 2006-2017. Data are rate ratio (95% CI). These models include a measure of municipal civil society density, averaged across 2004-2006, the only years where data is available.

Variables	Policy Council Model	Family Health Plan Models
Low Number of Councils (0-1)	1.47 (1.19)	
Intermediate Number of Councils (2-3)	-0.72** (0.21)	
High Number of Councils (4-5)	-1.63** (0.12)	
Low FHP Coverage (0-60%)		1.29 (0.77)
Intermediate FHP Coverage (61-80%)		-1.31** (0.25)
High FHP Coverage (>80%)		-2.51** (0.13)
Bolsa Família Management (>0.76)	-1.69** (0.41)	-1.42** (0.35)
Per Capita Health Spending (>5.77)	-2.63** (0.30)	-2.16** (0.38)
Civil Society Density (>mean)	-0.61** (0.12)	-0.58** (0.04)
Left-wing Mayors	-0.66* (0.29)	-0.70* (0.32)
Population Density (>25 per KM <sup>2</sup> )	0.45* (0.21)	0.34* (0.16)
Number of Observations	29, 412	28,960
Number of Municipalities	3,489	3,392

\*indicates significance at better than 0.05 (two-tailed test).

\*\*indicates significance at better than 0.01 (two-tailed test).

There was an expansion in rapid testing in 2013 through PSF. as testing improves, we might see increases in HIV/AIDS incidence (incidence=new cases) in subsequent years because they are better able to detect cases. By extension, municipalities with very ineffective HIV policy would likely record low rates of prevalence due to under testing.

We now include a model of HIV/AIDS prevalence with year dummy variables below to assess the prospect that better testing and greater health capacity could obscure underlying trends in the data, or even present trends in measurement that are opposite true trends for incidence and prevalence. The results in Table III (a) below are positive for 2014-2017, which provides evidence for advances in testing resulting in greater detection of cases.

Table III. (a) Fixed effects negative binomial models for association between HIV/AIDS prevalence per 1,000 Residents, Number of Policy Councils, and Family Health Program Coverage, 2006-2017. Data are rate ratio (95% CI). These models include dummies for each year in the dataset.

Variables	Policy Council Model	Family Health Plan Models
Low Number of Councils (0-1)	1.37 (1.28)	
Intermediate Number of Councils (2-3)	-0.74* (0.28)	
High Number of Councils (4-5)	-1.65** (0.19)	
Low FHP Coverage (0-60%)		1.24 (0.81)
Intermediate FHP Coverage (61-80%)		-1.34** (0.23)
High FHP Coverage (>80%)		-2.56** (0.08)
Bolsa Familia Management (>0.76)	-1.82** (0.46)	-1.55** (0.27)
Per Capita Health Spending (>5.77)	-2.61** (0.34)	-2.30** (0.52)
Left-wing Mayors	-0.64* (0.28)	-0.73* (0.32)
Population Density (>25 per KM <sup>2</sup> )	0.53** (0.17)	0.35* (0.15)
Number of Observations	53, 282	53,307
Number of Municipalities	5,088	5,102

\*indicates significance at better than 0.05 (two-tailed test).

\*\*indicates significance at better than 0.01 (two-tailed test).

Table IV. (a) Fixed effects negative binomial models for association between HIV/AIDS prevalence per 1,000 Residents, Number of Policy Councils, and Family Health Program Coverage, 2006-2017. Data are rate ratio (95% CI). These models include an interaction between the family health plan and all years. The results for all years following 2013 are significant. These are 2017 results below.

Variables	Family Health Plan Models
Low FHP Coverage (0-60%) * year	0.36 (0.31)
Intermediate FHP Coverage (61-80%) * year	-1.65** (0.14)
High FHP Coverage (>80%) *year	-2.94** (0.25)
Bolsa Familia Management (>0.76)	-1.52** (0.29)
FHP Coverage	0.13 (0.09)
Per Capita Health Spending (>5.77)	-2.20** (0.42)
Left-wing Mayors	-0.53 (0.32)
Population Density (>25 per KM <sup>2</sup> )	0.33* (0.12)
Number of Observations	51,660
Number of Municipalities	5,049

\*indicates significance at better than 0.05 (two-tailed test).

\*\*indicates significance at better than 0.01 (two-tailed test).